CLAIMS

1. An apparatus for driving small volumes of fluid, the apparatus comprising:

a substrate;

a first array of electrically conductive electrodes formed on the substrate; and a second array of electrically conductive electrodes formed on the substrate, the first and second array being interlaced and being arranged such that each of the electrodes in the second array has a width in a fluid driving direction which is greater than that of each of the electrodes in the first array and such that the first and second set electrodes are positioned so that each of the electrodes of the first set is not at a position equidistant from adjacent electrodes of the second set, wherein both of the arrays of electrodes have widths in the fluid flow direction and thickness selected such that, in use, by varying the peak value of an alternating drive voltage applied thereto the direction of flow of a fluid adjacent to the arrays of electrodes can be controlled.

2. The apparatus of claim 1, further comprising means for providing a variable alternating voltage to the first and second array of electrodes.

3. The apparatus of claim 1 or claim 2, wherein an insulator is provided over at least a portion of one or both of the electrode arrays.

4. The apparatus of any preceding claim arranged to drive fluid passing thereover in two opposite directions in order to provide a mixing effect.

5. The apparatus of any preceding claim further comprising a third set of electrodes having a width substantially identical to that of the first set,

interlaced with the second set of electrodes and separated from the first set by an insulator.

6. An apparatus according to any of the proceeding claims, in which the electrodes and substrate are formed as part of a CMOS process.

7. An apparatus according to any preceding claim configured to move elements, such as semiconductor components, within a fluid passing thereover

8. An apparatus according to any of claims 1 to 5 arranged to drive a micromachine.

9. An apparatus according to any of claims 1 to 5 arranged to be employed in a biochemical analysis process or drug manufacture process.

10. A device for moving fluid by plug flow comprising two apparatus according to any preceding claim facing one another and defining a cavity therebetween.

11. A device for drawing fluids from two sources, mixing them and pumping them, the device comprising a first apparatus according to any of claims 1 to 8; a second apparatus according to any of claims 1 to 8 and having its electrodes arranged to be a mirror image of those of the first apparatus; and a third apparatus according to any of claim 1 to 8 positioned at the meeting point of the first and second apparatus.

12. A diffusion reactant monitoring device comprising an apparatus according to any of claims 1 to 6 which at least partially defines a diffusion reactant chamber and further comprising at least two supply ports and an outlet including an illuminating light source and a filtered opto-electrical detector.

13. A method apparatus for driving small volumes of fluid, the method comprising the steps of:

providing a substrate;

providing a first array of electrically conductive electrodes formed on the substrate and a second array of electrically conductive electrodes formed on the substrate, the first and second array being interlaced and being arranged such that each of the electrodes in the second array has a width in a fluid driving direction which is greater than that of each of the electrodes in the first array and such that the first and second set electrodes are positioned so that each of the electrodes of the first set is not at a position equidistant from adjacent electrodes of the second set; and

by varying the peak value of an alternating drive voltage applied thereto, controlling the direction of flow of a fluid adjacent to the arrays.

14. The method of claim 13, wherein the fluid is driven in two opposite directions in order to provide a mixing effect.

15. A method of monitoring a diffusion reactant, comprising the method of claim 14, and further comprising the step of providing fluids from at least two supply ports; and providing mixed fluid to an outlet including an illuminating light source and a filtered opto-electrical detector.